भारतीय मानक
Indian Standard

IS 2783 : 2023

वस्त्रादि — बालक्लावा कैप्स, ऊनी, सादा-बुना हुआ — विशिष्टि

(तीसरा पुनरीक्षण)

Textiles — Balaclava Caps, Wool, Plain-Knitted — Specification

(Third Revision)

ICS 59.060.10; 59.080.30

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June 2023 **Price Group 6**

Hosiery Sectional Committee, TXD 10

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Hosiery Sectional Committee had been approved by the Textile Division Council.

A balaclava cap, also known as a balaclava helmet is a form of cloth headgear designed to expose only part of the face, usually the eyes and mouth. Depending on style and how it is worn, only the eyes, mouth and nose, or just the front of the face is unprotected. Balaclava caps covered by this standard are generally used by defence and other paramilitary forces.

This standard was first published in 1964, and subsequently revised in 1969 and 1976. This standard has been revised again to incorporate the following major changes:

a) Title of the standard has been modified; and
b) BIS Certification Marking clause has been updated.

The composition of the committee responsible for the formulation of this standard is listed in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILES — BALACLAVA CAPS, WOOL, PLAIN-KNITTED — SPECIFICATION

(Third Revision)

1 SCOPE

1.1 This standard prescribes the constructional details and other particulars of plain-knitted balaclava caps made from worsted yarn.

1.2 This standard does not specify the general appearance, lustre, feel, type of finish, shade and colour combination of balaclava caps (*see* also **5.3**).

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex A.

3 TERMINOLOGY

For the purpose of this standard the definitions as given in IS 3596 shall apply.

4 MANUFACTURE

4.1 Yarn

The yarn used for knitting balaclava caps shall be spun on worsted system from wool tops of not less than 56s grade conforming to IS 5911. The approximate count of yarn shall be 90 tex × 2 (Nm 11/2).

4.2 Seams and Stitches

4.2.1 The sewing details shall be as follows:

Sl No. (1)	*Portion to be Stitched* (2)	*Type of Stitch* (3)	*Approximate Count of Sewing Thread* (4)
i)	Two layers at the bottom and 4 layers atthe top of the cap	3-Thread overlock	Two strands of 25 tex × 3 (24s/3 cotton count) in the needle and primary (small) looper and one strand of yarn of the same count as used in knitting the cap in the secondary (big) looper
ii)	Face opening	Lock stitches	25 tex × 3 (24s/3 cotton count)

4.2.2 The sewing thread shall be of same shade as that of the caps and preferably conform to IS 1720. The stitches shall be of even tension throughout and all the loose ends securely fastened off. The number of stitches shall not be less than 4 per centimetre.

4.3 Balaclava Caps

4.3.1 The knitted fabric shall be given anti-shrink treatment, preferably at the yarn stage.

4.3.2 Both layers of knitted fabric on the inside shall be given a raised finish before tailoring so as to ensure the required thickness of the four layers.

4.3.3 Balaclava caps shall be cut and tailored out of two pieces of seamless plain knitted tubular fabric. The back of the two pieces shall face each other in the made-up cap so as to make it reversible. The shade of caps shall be as agreed to between the buyer and the seller.

NOTE — The caps for the Defence requirements shall be manufactured from two folds of knitted fabric one olive green and the other white.

4.4 Freedom from Defects

The balaclava caps shall be reasonably free from manufacturing defects such as large mends, ladders, dropped stitches, sewing defects, chemical damages and dyeing defects, such as uneven dyeing and streakiness.

5 REQUIREMENTS

5.1 Dimensions and Mass

The caps shall conform to the requirements of Table 1 read with Fig. 1.

5.2 The caps shall also conform to other requirements as given in Table 2.

5.3 Sealed Sample

If, in order to illustrate or specify the indeterminable characteristics, such as general appearance, lustre, feel, type of finish, depth of colour and colour combination, a sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.

5.3.1 The custody of the sealed sample shall be a matter of prior agreement between the buyer and the seller.

6 MARKING

6.1 A cloth label marked with the following information shall be securely attached at the bottom on the inner side of the balaclava caps:

a) Size;
b) Manufacturer’s name, initials or trade-mark; and
c) Any other information/instruction provided by the manufacturer/required under law.

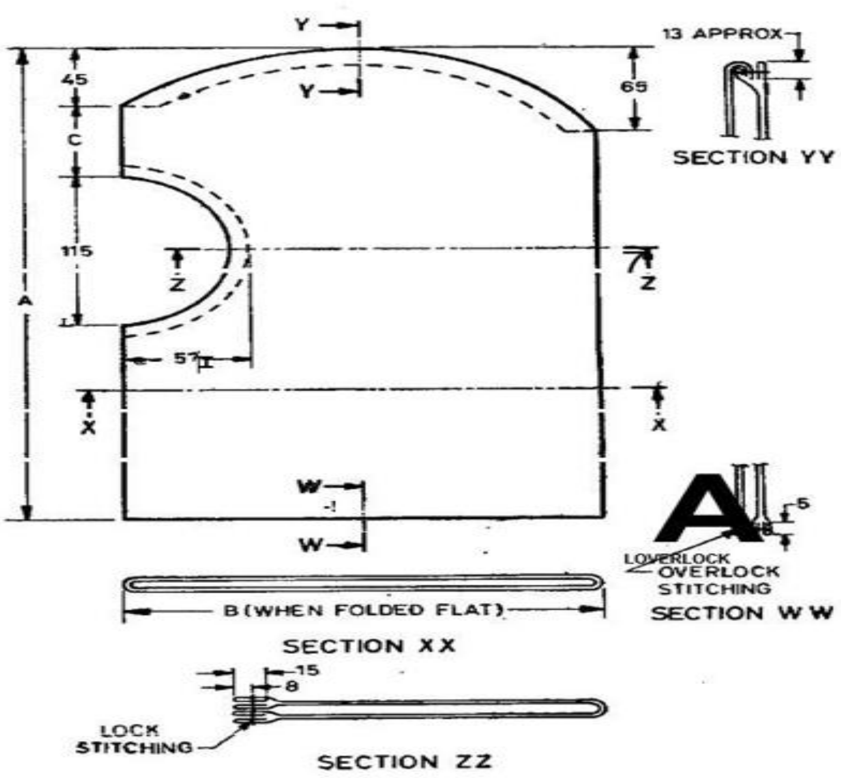
Table 1 Dimensions and Mass of Balaclava Caps
(*Clause* 5.1)

Sl No.	**Size**	**Dimensions**			**Mass of 10 Caps, g,** *Min* (*see* Note)	**Recommended Diameter of Machine, mm**	**Total Number of Needles**
		Length,cm	Width, cm, *Min*	Length of Forehead, cm			
		A	B	C			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Small	36.0	23.0	5.5	1 290	200	190
ii)	Medium	40.0	24.0	6.5	1 400	215	200
iii)	Large	47.0	27.0	18.0	1 720	230	210
Tolerance		± 1.0	—	± 0.5	—	—	—
Method of Test, Ref to		**B-2**	**B-2**	**B-2**	**B-3**	—	—

NOTE — A tolerance of − 5 percent shall be permissible on the average mass of individual cap provided the minimum collective mass is maintained as specified above.

Table 2 Requirements of Balaclava Caps
(*Clause* 5.2)

Sl No. (1)	Characteristics (2)	Requirement (3)	Method of Test (4)
i)	Courses/dm	56 ± 4	**B-4**
ii)	Thickness of 4 layers of cap, mm, *Min*	8	IS 7702
iii)	*p*H value of aqueous extract	5.0 - 7.5	IS 1390
iv)	Dimensional change (due to relaxation),		**B-5**
	Length wise Width wise	5.0 percent, *Max* 3.0 percent, *Max*	
v)	Dimensional change (due to felting),		**B-6**
	Length wise Width wise	10.0 percent, *Max* 7.0 percent, *Max*	
vi)	Scouring loss	5.0 percent, *Max*	**B-7**
vii)	Colour fastness to:		
	a) Light	4 or better	IS/ISO105-X05 IS/ISO 105-B02
	b) Washing	4 or better	IS/ISO 105-C10



All dimensions in millimetres

FIG. 1 BALACLAVA CAP

6.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

7 PRESERVATION

The caps shall be preserved with a heavy dose of naphthalene (with a minimum of 5 kg per cubic metre of the volume of the bale).

8 PACKING

8.1 Unless otherwise agreed to between the buyer and the seller, The balaclava caps of the same size and shade shall be packed together in a bale in accordance with IS 2518 or IS 3553 as the case may be.

8.2 Alternatively, these may be packed by the method given below when specifically agreed to between the buyer and the seller:

Ten caps suitably folded shall be wrapped with one layer of polyethylene film (*see* IS 2508) or craft paper (*see* IS 1397) and tied with twine or string at least at 2 places to form a unit pack. 20 such packs (200 caps) shall then be enclosed in an outer layer of heavy tee cloth (see IS 3751) or equivalent hessian cloth to form a bale weighing approximately 35 kg. The bale suitably stitched shall be made secure by fastening with steel strips (or hoops) or cordages of sufficient strength.

9 SAMPLING

9.1 In any consignment all the caps of the same size and colour delivered to a buyer against a dispatch note shall constitute a lot.

9.1.1 The conformity of the lot to the requirements of this specification shall be determined on the basis of the tests carried out on the samples selected from it.

9.2 Unless otherwise agreed to between the buyer and the seller, the number of caps, depending upon the size of the lot, shall be selected at random in accordance with co1 (2) of Table 3.

9.3 The sample size and the criteria for conformity for various characteristics shall be as follows:

Sl No. (1)	*Characteristics* (2)	*Sample Size* (3)	*Criterion forConformity* (4)
i)	Freedom from defects dimensions and number of courses	All the caps selected according to co1 (3) of Table 3	Non-conforming caps not to exceed the corresponding number given in co1 (4) of Table 3
ii)	Mass	All the caps selected according to co1 (3) of Table 3	Each observed value tosatisfy the specified requirement
iii)	Specification for wool tops, thickness, *p*H value dimensional change scouring loss, colour fastness to washing	All the caps selected according to co1 (5) Table 3	Non-conforming caps not to exceed thecorresponding number given in co1 (6) of Table 3
iv)	Colour fastness to light	One in case of lot size of 500 caps and two above that	Each cap to satisfy the specified requirement

Table 3 Number of Caps to be Selected from a Lot and Permissible Number of Non-Conforming Caps

(*Clauses* 9.3 and 9.4)

Sl No.	**Numbers of Caps in the Lot**	**Non-Destructive Testing**		**Destructive Testing**	
		Number of Caps to be Selected	Permissible Number of Non-Conforming Caps	Number of Caps to be Selected	Permissible Number of Non-Conforming Caps
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 300	10	1	2	0
ii)	301 - 500	20	1	3	0
iii)	501 - 1 000	30	2	5	0
iv)	1 001 - 3 000	50	3	8	0
v)	3 001 and above	80	5	13	1

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No./Other publications	*Title*
IS 397 (Part 1) : 2003	Method for statistical quality control during production: Part 1 Control charts for variables (*second revision*)
IS 1390 : 2022	Methods for determination of *p*H value of aqueous extract of textile materials (*third revision*)
IS 1397 : 2020	Kraft paper for packing and wrapping — Specification (*third revision*)
IS 1720 : 1978	Specification for cotton sewing threads (*first revision*)
IS 2508 : 2016	Polyethylene films and sheets — Specification (*third revision*)
IS 2518 : 1964	Code for seaworthy packaging of wool hosiery yarn and goods
IS 3353 : 1966	Code for inland packing of wool hosiery yarn and goods
IS 3596 : 1967	Glossary of terms relating to hosiery
IS 3751 : 1993	Textiles — Heavy cee jute cloth — Specification (*first revision*)
IS 5911 : 1977	Fineness grades of wool tops (*first revision*)
IS 6359 : 1971	Method for conditioning of textiles
IS 7702 : 2012	Textiles — Determination of thickness of textiles and textile products (*first revision*)
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness: Part C10 Colour fastness to washing with soap or soap and soda
IS/ISO 105-B02 : 2014	Textiles — Tests for colour fastness: Part B02 Colour fastness to artificial light: Xenon arc fading lamp test
IS/ISO 105-X05 : 1994	Textiles — Tests for colour fastness: Part X05 Colour fastness to organic solvents

ANNEX B

(*Tables* 1 and 2)

METHODS OF TEST

B-l CONDITIONING OF TEST SPECIMENS AND ATMOSPHERIC CONDITIONS FOR TESTING

The test specimens shall preferably be conditioned for testing and tested in the standard atmosphere as given in IS 6359.

B-2 DIMENSIONS

Take a cap constituting the test sample (*see* **9.3**). Lay it flat on a horizontal surface. Remove all creases and wrinkles without distorting it. Measures correct to the nearest millimetre the dimensions given in Table 1.

B-3 MASS

Take a set of 10 caps from the test sample (*see* **9.3**). Condition them to moisture equilibrium for 24 hours (*see* **B-1**) and weigh to an accuracy of 10 g. Also determine the mass of individual caps.

B-4 COURSES

Take a cap constituting the test sample (*see* **9.3**). Lay it flat on a horizontal surface. Remove all creases and wrinkles without distorting it. Count with the help of a pick glass or magnifying glass, the number of courses per decimetre of the fabric.

B-5 DIMENSIONAL CHANGE (DUE TO RELAXATION)

B-5.1 Marking of Test Specimens

Take one of the pieces from the test sample (*see* **9.3**). Mark centrally on it by means of indelible ink or a fast dyed cotton sewing thread an area 15 cm × 15 cm with two of its sides running in the direction of wales and the other two in the direction of courses. Spread this test specimen on a flat smooth surface, carefully removing by hand all creases and wrinkles. Within this area, mark six pairs of marks, three pairs each in the wales and courses direction in such a way that the distance between each pair or marks is the same.

B-5.2 Procedure

B-5.2.1 Place test specimen on a glass plate and carefully remove by hand all creases and wrinkles without stretching the test specimen and place the other glass plate on the test specimen. Measures correct to the nearest millimetre, the distance between each pair of marks separately.

B-5.2.2 Lay the test specimen flat in a water tight tray of suitable size and of depth 10 cm, Min. Soak it under a head of 25 mm of water containing 0.5 percent suitable wetting agent at 30 °C to 35 °C for 2 hours. Drain out the water and remove the test specimen carefully so that it is not stretched and lay it flat on a smooth surface. Remove the excess of water by absorbent material and dry it at room temperature.

NOTE — Removal of excess water by wringing the test specimen is not permitted.

B-5.2.3 After drying, condition the test specimen to moisture equilibrium at the room temperature. Place it on the glass plate, carefully remove all wrinkles and creases and place the other glass plate on the test specimen. Measures correct to the nearest millimetre, the distance between each pair of marks separately. Preserve the specimen for **B-6.1.1**.

B-5.3 Calculation

B-5.3.1 Calculate separately the percentage of dimensional change both in the directions of wales and courses by the following formula:

$$Sr = \frac{a-b}{a} \times 100$$

where

Sr = dimensional change (due to relaxation), percent;
a = the distance between a pair of marks (along the wales or courses as the case may be) before soaking; and
b = the distance between the same pair of marks after soaking.

B-5.3.2 Calculate separately the dimensional change (due to relaxation) of all the three lines in the direction of wales and courses and calculate average dimensional change (due to relaxation) in each direction.

B-6 DIMENSIONAL CHANGE (DUE TO FELTING)

B-6.1 Procedure

B-6.1.1 This test is to be carried on the same specimen (*see* **B-5.2.3**) for which the relaxation shrinkage has been determined. Soak it under a head of 25 mm of water containing 0.5 percent suitable wetting agent at 30 °C to 35 °C for overnight. Drain out the water and remove excess water from the test specimen by passing through rubber wringers or using hydroextractor so that the water retained is about 60 percent of air-dry mass of specimen.

B-6.1.2 Evenly wet the specimen with 5 percent soap solution corresponding to 25 percent air-dry mass of the specimen. This is conveniently done by spraying it with soap solution by means of a pipette or burrette. Subject the specimen to 2 000 blows at the rate of 70 blows per minute in a suitable single-hammer milling machine, taking care that those portions of the specimen receive initial hammering which are least exposed to severe milling during actual use. Wash the specimen in distilled water. Dry and condition it to moisture equilibrium at room temperature. Measure the distances between the different pairs of marks as in **B-5.2.3**.

B-6.2 Calculation

B-6.2.1 Calculate separately the percentage of dimensional change (due to felting) both in the direction of wales and courses by the following

$$Sf = \frac{b-c}{b} \times 100$$

where

Sf = dimensional change (due to felting), percent;
B = the distance between a pair of marks (along the wales and courses as the case may be) as noted in **B-5.2.3**; and
c = the distance between the same pair of marks as noted in **B-6.1.2**.

B-6.2.2 Similarly calculate separately the dimensional change (due to felting) of all the three lines in direction of wales and courses and calculate the average dimensional change (due to felting) in each direction.

B-7 SCOURING LOSS

B-7.1 Test Specimen-Cut about 10 g from each sample. This shall constitute the test specimen.

B-7.2 Procedure

B-7.2.1 Dry the test specimen to constant mass in the drying oven at (105 ± 3) ºC temperature and determine its mass accurately.

NOTE — Constant mass shall be deemed to have been reached if the difference between the two successive weighings at an interval of 20 minutes is less than 0.05 percent.

B-7.2.2 Extract the above specimen with a mixture of benzene and methyl alcohol in the proportion of 3 : 2 in a Soxhlet apparatus for 4 hours at the rate of 5 extractions per hour, by placing the specimen in a thimble and covering it with cotton wool previously extracted with the above stated mixture of benzene and methyl alcohol in the proportion of 3 : 2. The solvent shall then be distilled off from the extract. Dry the residue to a constant mass (*see* Note under **B-7.2.1**) at (105 ± 3) ºC and determine the mass accurately.

B-7.3 Calculations

Calculate the scouring loss by the following formula:

$$\text{Scouring loss, percent} = \frac{a}{b} \times 100$$

where

a = mass of the dry residue (*see* **B-7.2.2**); and
b = mass of the test specimen (*see* **B-7.2.1**).

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Hosiery Sectional Committee, TXD 10

Organization	*Representative(s)*
The South India Textile Research Association, Coimbatore	DR PRAKASH VASUDEVAN (***Chairperson***)
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